WHAT IS CLAIMED IS:

1. A method for measuring a halogen concentration comprising introducing a gas containing a halogen gas into a metal iodide-containing solution to liberate iodine, and determining quantitatively the liberated iodine by measuring a visible light transmittance of the solution at a specific wavelength.

2. The method for measuring a halogen concentration according to claim 1, wherein the metal iodide-containing solution contains starch.

3. The method for measuring a halogen concentration according to claim 1, wherein the specific wavelength ranges from 460 nm to 520 nm.

4. The method for measuring a halogen concentration according to claim 2, wherein the specific wavelength ranges from 580 nm to 780 nm.

5. The method for measuring a halogen concentration according to claim 3 or 4, wherein the visible light is a laser beam.

6. The method for measuring a halogen concentration according to claim 1 or 2, wherein the halogen gas is chlorine gas or fluorine gas.

7. A method for continuously measuring a halogen concentration, comprising introducing continuously a gas containing a halogen gas into a continuously flowing metal iodide-containing solution to liberate iodine, and determining quantitatively the liberated iodine by measuring a visible light transmittance of the solution at a specific wavelength.

8. The method for continuously measuring a halogen concentration according to claim 7, wherein the metal iodide-containing solution contains starch.

9. The method for continuously measuring a halogen concentration according to claim 7, wherein the specific wavelength ranges from 460 nm to 520 nm.

10. The method for continuously measuring a halogen concentration

according to claim 8, wherein the specific wavelength ranges from 580 nm to 780 nm.

11. The method for continuously measuring a halogen concentration according to claim 9 or 10, wherein the visible light is a laser beam.

12. The method for continuously measuring a halogen concentration according to claim 7 or 8, wherein the halogen gas is chlorine gas or fluorine gas.

13. A method for measuring a hydrofluorocarbon concentration, comprising measuring a concentration of at least one kind of hydrofluorocarbon in a gas mixture by infrared spectrometry.

14. The method for measuring a hydrofluorocarbon concentration according to claim 13, wherein the hydrofluorocarbon concentration is not higher than 8 mole%.

15. The method for measuring a hydrofluorocarbon concentration according to claim 13 or 14, wherein the gas mixture contains a perfluorocarbon, and hydrogen fluoride and/or fluorine, and the concentrations of the perfluorocarbon and/or the hydrogen fluoride are measured simultaneously by infrared spectroscopy.

16. The method for measuring a hydrofluorocarbon concentration according to claim 15, wherein the gas mixture is rich in the perfluorocarbon and/or the hydrogen fluoride.

17. The method for measuring a hydrofluorocarbon concentration according to claim 13, wherein condensation of a gas on a surface of a measurement cell is prevented by heating the measurement cell.

18. The method for measuring a hydrofluorocarbon concentration according to claim 17, wherein hydrogen fluoride gas is removed after the gas concentration measurement by introducing a purge gas into the heated measurement cell.

19. The method for measuring a hydrofluorocarbon concentration according to claim 13, wherein the hydrofluorocarbon is represented by General Formula (1):

$$C_xH_yF_z \qquad (1)$$

where x, y, and z are respectively an integer satisfying the relations: $1 \leqq x \leqq 3$, $1 \leqq y \leqq 4$, $1 \leqq z \leqq 7$, and $2x+2 = y+z$.

20. The method for measuring a hydrofluorocarbon concentration according to claim 13, wherein the hydrofluorocarbon is trifluoromethane, 1,1,1,2-tetrafluoroethane and/or pentafluoroethane, and the concentration thereof is measured respectively at a wavenumber ranging from 2900 cm^{-1} to 3100 cm^{-1} as the measurement wavenumber.

21. The method for measuring a hydrofluorocarbon concentration according to claim 15, wherein the perfluorocarbon is tetrafluoromethane and/or hexafluoroethane, and the concentration thereof is measured respectively at a wavenumber ranging from 1000 cm^{-1} to 2700 cm^{-1} as the measurement wavenumber.

22. The method for measuring a hydrofluorocarbon concentration according to claim 15, wherein the concentration of hydrogen fluoride in the gas mixture is measured at a wavenumber ranging from 3600 cm^{-1} to 4300 cm^{-1} as the measurement wavenumber.

23. A measurement apparatus for continuously measuring a halogen concentration for use in the continuous measurement of a halogen concentration according to claim 7, comprising a reaction section for liberating iodine; a liquid feed pump for introducing a metal iodide-containing solution into the reaction section; an introduction tube for sampling a part of a reaction gas containing a halogen gas from a halogen compound production line; a gas flow rate controller connected to the introduction tube and serving to introduce continuously the

halogen-containing gas into the reaction section; a gas-liquid separation section for separating an undissolved gas; a measurement section equipped with a visible light source for emitting visible light for measurement of iodine liberated in the reaction section, and a detector for measuring a transmittance of the visible light; and a data processing section.

24. A measurement apparatus for continuously measuring a halogen concentration for use in the continuous measurement of a halogen concentration according to claim 8, comprising a reaction section for liberating iodine; a liquid feed pump for introducing a solution containing a metal iodide and starch into the reaction section; an introduction tube for sampling a part of a reaction gas containing a halogen gas from a halogen compound production line; a gas flow rate controller connected to the introduction tube and serving to introduce continuously the halogen-containing gas into the reaction section; a gas-liquid separation section for separating an undissolved gas; a measurement section equipped with a visible light source for emitting visible light for measurement of iodine liberated in the reaction section, and a detector for measuring a transmittance of the visible light; and a data processing section.

25. The measurement apparatus for continuously measuring a halogen concentration according to claim 23 or 24, wherein the visible light source is a laser device.

26. The measurement apparatus for continuously measuring a halogen concentration according to claim 25, wherein the laser device is a semiconductor laser device.

27. An apparatus for measuring a hydorfluorocarbon concentration for the method for measuring a hydrofluorocarbon concentration in a gas mixture according to claim 13, comprising a measurement cell equipped with a heating means; an introduction tube for sampling a part of a

reaction gas from a perfluorocarbon production line; automatic switching valve connected with the introduction tube and a purge gas introduction tube for controlling and switching quantity of introduction of the reaction gas and a purge gas into the measurement cells; an infrared spectrometer; and a data processing device having a calibration curve installed therein.

28. The apparatus for measuring a hydorfluorocarbon concentration according to claim 27, wherein the measurement cell has an optical window made from calcium fluoride for transmitting infrared ray.

29. A process for producing a halogen compound by reaction of an organic compound with a halogen gas in a gas phase, wherein the halogen concentration is adjusted by the method for continuously measuring a halogen concentration as set forth in claim 7.

30. The process for producing a halogen compound according to claim 29, wherein the halogen gas is chlorine gas or fluorine gas.

31. The process for producing a halogen compound according to claim 29 or 30, wherein the organic compound is at least one hydrofluorocarbon represented by General Formula (2):

$$C_aH_bF_c \qquad (2)$$

where a, b, and c are respectively an integer satisfying the relations: $1 \leqq a \leqq 3$, $1 \leqq b \leqq 4$, $1 \leqq c \leqq 7$; and $b+c = 4$ for $a=1$, $b+c = 6$ for $a=2$, and $b+c = 8$ for $a=3$;

and/or at least one fluoroolefin represented by General Formula (3):

$$C_dH_eF_f \qquad (3)$$

where d, e, and f are respectively an integer satisfying the relations: $2 \leqq d \leqq 3$, $0 \leqq e \leqq 5$, $1 \leqq f \leqq 6$; and $e+f = 4$ for $d=2$, and $e+f = 6$ for $d=3$.

32. The process for producing a halogen compound according to claim 31, wherein the hydrofluorocarbon is at least one selected from the group consisting of trifluoromethane, 1,1,1,2-tetrafluoroethane,

pentafluoroethane, hexafluoropropane, and heptafluoropropane.

33. The process for producing a halogen compound according to claim 31, wherein the fluoroolefin is at least one selected from the group consisting of tetrafluoroethylene, trifluoroethylene, and hexafluoropropene.

34. The process for producing a halogen compound according to claim 30, wherein the concentration of the fluorine gas is controlled to be not higher than the explosion range thereof.

35. A process for producing a perfluorocarbon by reacting a hydrofluorocarbon with fluorine gas in a gas phase, wherein the concentration of the hydrofluorocarbon is controlled by the method for measuring a hydrofluorocarbon concentration as set forth in claim 13.

36. The process for producing a perfluorocarbon according to claim 35, wherein the concentration of the hydrofluorocarbon is controlled to be not higher than 8 mole%.

37. The process for producing a perfluorocarbon according to claim 35 or 36, wherein the hydrofluorocarbon is represented by General Formula (1):

$$C_xH_yF_z \qquad (1)$$

where x, y, and z are respectively an integer satisfying the relations: $1 \leqq x \leqq 3$, $1 \leqq y \leqq 4$, $1 \leqq z \leqq 7$, and $2x+2 = y+z$.

38. The process for producing a perfluorocarbon according to claim 37, wherein the hydrofluorocarbon is at least one selected from the group consisting of trifluoromethane, 1,1,1,2-tetrafluoroethane, and pentafluoroethane.